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BOTANY.

Notes on The Flora of Western South Dakota.—The following paper was read before the Botanical Seminary of the University of Nebraska by Professor T. A. Williams, of Brookings, S. D.

The region west of the Missouri River may be divided into three quite distinct botanical districts. The Range, The Black Hills, and The Badlands. The first is much the largest, extending from the River on the North and East to The Badlands on the South and the Black Hills on the West. It is a broad stretch of prairie varying from level tableland to rolling prairie or in many places becoming quite rough and broken, especially along the streams which traverse the region at varying intervals. The second region comprises the highlands, cañons and mountains of the Black Hills country. The Badland region begins near the Mouth of Indian Creek on the Cheyenne River and extends southward skirting the Hills, reaching into Nebraska. The strip of country varies from ten to about thirty miles wide. The surface is very broken and the soil dry and sterile, excepting in some of the basins where a little poor water is found giving life to *some* vegetation.

My visit to these regions was made in August of the past year (1891). Not a very good time for collecting so far as the number of specimens is concerned, but nevertheless a time when one can form a fair idea of what the characteristic plants of the regions are.

I shall not soon forget the impressions I received when, as we climbed the bluffs out of the narrow valley of the River at Ft. Pierre, the wide stretch of miles upon miles of dry prairie came to view. As far as the eye could reach nothing could be seen but that peculiar monotonous color of grass dried prematurely. Not a very inviting outlook for a botanist. Along the bluffs of the River we had made several finds and were beginning to hope that we should have a profitable trip, but at the sight of that dreary waste of sunburnt prairie our hopes fell. However our fears proved to be groundless, for as we soon learned things are not always "what they seem." The creeks, which occur here and there throughout the range, are veritable mines for the botanist. Very few of them contain running water at this time of the year. Usually they are nothing more than a chain of ponds, containing from a few inches to a few feet of water. These streams are a continual source of delight to the collector. They are usually separated a considerable distance by a stretch of dry prairie which forms a very effective barrier to an interchange of species, consequently each stream has a few plants that seem to be peculiar to its own territory, and the collector is continually running across new things. There are a few of the larger ponds that do not contain one or more species of *Chara*, *Potamogeton*, or some other of the water loving plants. *Potamogeton hillii*, *P. pectinatus*, and *P. zosteræfolius*, were common. *P. fluitans* was found at Mitchell's Holes, but at no other place; *Sagittaria variabilis* occurred in some of its various varieties throughout the entire region; *Atriptex argentea*, *Xanthium canadense*, *Solanum rostratum*, *Euphorbia marginata*, *Helianthus annuus* and *H. petiolaris* were common all along the trail from Pierre to Rapid City. At Ft. Pierre, Peno Hills, and Willow Springs *Amorpha microphylla* was common along with *A. fruticosa* and *A. canescens*. Our old friend *Saponaria vaccaria* was found at intervals along the entire way to the Black Hills, a good example of man's influence in the introduction and distribution of plants. Does not this give a hint as to how eastern species advance westward? I have noticed similar instances along the old freighting trail in Nebraska, which runs from Nebraska City to Denver. The principal grasses of the range are, *Boutelova oligastachya*, *B. hirsuta* and more rarely *B. racemosa*, *Buchloe dactyloides*, (fast disappearing), *Agropyrum glaucum*, several species of *Calamagrostis*, and *Stipa comata*, the last species replacing the common *S. spartea* of the eastern part of the State. *Agropyrum glaucum* forms by far the greater part of winter as well as the summer feed of the stock of the range.

Spartina cynosuroides, several species of *Glyceria*, *Carex*, and *Scirpus* grow along the streams and form no small part of the food of the stock during the drier seasons of the year.

Oxytropus lambertii was common, many species of *Astragalus* were found in fruit but few in bloom. Plums and cherries were of frequent occurrance along the larger streams. One stream in particular has its banks lined with plum bushes for miles and miles and is called Plum Creek. Many people go thirty or forty miles to get the plums, many of which are very large and toothsome; *Shepherdia argentea* in both red and yellow-fruited forms occurs from the Missouri River to the Black Hills. The fruit of some of the trees of this species is quite palatable. Not far from Plum Creek on a hillside I found *Shrankia uncinata*. The whole hillside was a mass of this plant and I procured some of the finest specimens of it that I have ever seen. While we were camped at Grindstone Buttes I collected my first specimens of *Marsilia vestita*. It grew along the margin of a small pond;

many specimens were found where both of the so-called varieties of this species grew on *one stem*, one part of which grew on the bank and the other in the water. I thought I had made a great find but as I learned later this little plant is very common from the Buttes to the Black Hills, hardly a pond being free from it.

On the summits of the Buttes we found *Dalea aurea* in considerable quantity but nowhere else did it occur.

At Peno Hills, about 70 miles East of the Black Hills we found many old friends and many new ones. Along the stream which rises in these hills were good sized trees of elm, boxelder, ash, (*Fraxinus viridis* and *F. pubescens*), hackberry, willow and the like. Here we also found *Amelanchier alnifolia*, *Crataegus coccinea*, *Prunus virginiana P. americana* and *P. pumila.* The fruit of both of the cherries was very fine, while *some* small bushes of sand-cherry were found bearing fruit as large and luscious as that of the ordinary cultivated cherries. On the North slope of one of the hills *Juniperus sabina* var *procumbens* formed dense mats, especially along the small draws that lead down from the hillside. The only willows collected in this region were *Salix longifolia* and *S. cordata* var. *vestita* though I am certain that *S. amygdaloides* will be found also.

There are quite a number of small streams between Pierre and the Cheyenne River that would be as well wooded as is this stream at Peno Hills if they could be protected from prairie fires. We saw many fine groves of elm, ash, boxelder and cottonwood that had been killed by fires after the trees had grown to be two and three feet in diameter. The groves at Peno Hills are protected from the fires by means of the line of dry barren hills along the North and West and have become the pride of the whole region.

At the Cheyenne River we found some interesting things; coming down from the high uplands to the so-called second bottom we found *Psoralea tenuiflora* in abundance, for the first time. It reaches its finest development here, being much larger than I have ever seen it elsewhere. On the bluffs that border the narrow valley grew *Ipomoea leptophylla*, several *Oenotheras*, *Mentzelia ornata M. nuda*, *Musenium tenuifolium*, *Stanleya pinnata* and *Lupinus pusillus* (almost always accompanied by a fungus, probably a Phoma, which was very injurious to it.)

Along the cañons near Smithville the silvery form of the red cedar was quite abundant, offering a marked contrast to the common form. The buffalo berry, in both forms was plentiful everywhere. *Astralagus bisulcatus* and its near relative *A. haydenianus* grew on some of the bluffs, on the west side of the river. The former was also found on the range and in the Badlands.

On the bottoms, which are very sandy, we found *Astragalus latiflorus* and *A. kentrophyta* in abundance. Also *Dalea alopecuroides, D. laxiflora, Croton texensis, Artemisia canadensis, A. filifolia, Stipa comata, Oryzopsis cuspidatus, Munroa squarrosa, Euphorbia petaloidia* and *E. hexagona.* The principal timber tree of the bottom is *Populus monilifera* while *Shepherdia* makes most of the thickest growth. Elm, ash, boxelder, willow, and hackberry tree occurred, but seldom in any great quantities at this place.

Farther up the river these are more abundant. The cottonwood always predominates however. The trees of this species are seldom so high as those seen in Eastern Dakota or Nebraska, but are of a much more close or bushy growth, due doubtless to the fact that the winds often break out the tops, thus producing more branches.

(*Concluded in February Number.*)